146MHz RB-TV
A Practical Operators Guide

Shaun O’Sullivan G8VPG

New 2m allocation

- 146-147MHz
- 25W ERP maximum power
- 20m maximum aerial height
- Annual NoV to 31 October from RSGB
- Not in GD, GU & GJ
- 146.9375MHz upper limit within 40km of Scottish border/coast

146MHz RB-TV

- 146.5MHz centre frequency
- DVB-S modulation
- H264 Codec
- Symbol rates 333, 250 & 125 ks/s
- FEC 7/8
- Sound usually disabled

Raspberry Pi & RPiDATV

- Raspberry Pi & camera can produce a RB-TV picture by itself
- Uses harmonic of clock oscillator 437.5MHz
- Called “Ugly-DATV” because it is a dirty signal not suitable for transmission

Raspberry Pi & Digithin

- Modulator board fits over Rpi
- 333ks/s fixed output
- BATC PCB available
- Needs carrier oscillator
- Low level output needs filtering & amplification

Raspberry Pi & RBTVMOD

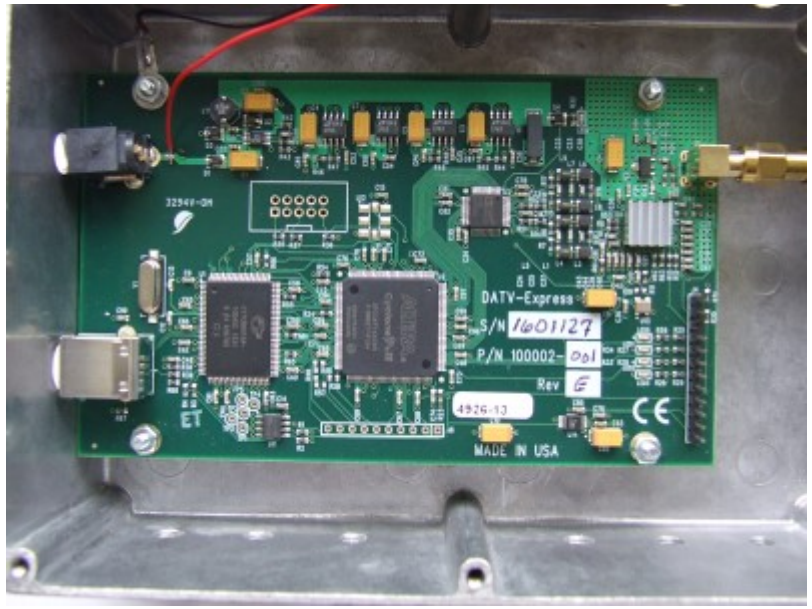
Photograph G4KLB

- G4KLB is developing RBTVMOD with others
- Variable filters allow 125, 250, 333 & 500ks/s
- Watch GB3SQ Sunday net for news

146.5MHz Carrier Oscillator

- ADF4360-8 PLL/VCO
- Range of fixed & variable frequency boards available from G8BYI
- Chip very small - buy assembled version!

DATV Express

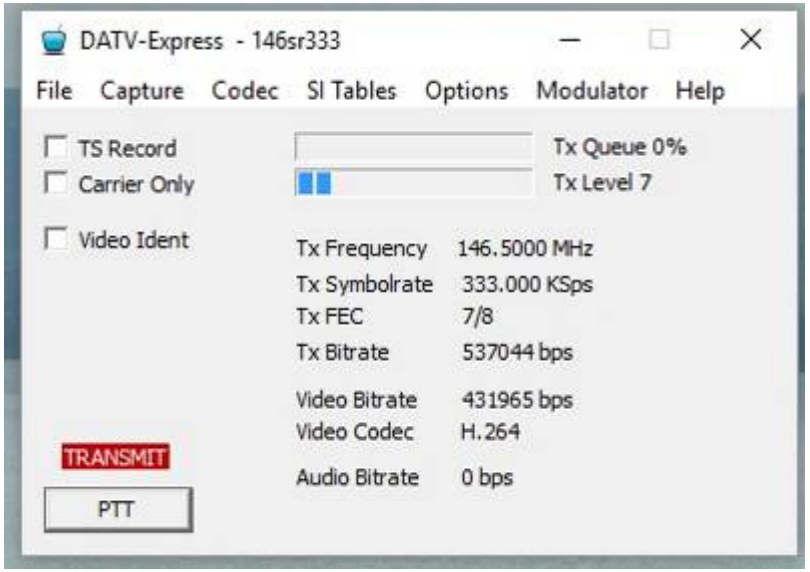


- A very flexible software defined transmitter
- All symbol rates
- All bands 70MHz to 2.45GHz from on board oscillator
- New Windows control software very easy to use

VMix

- Free version of Vmix just requires registration
- Simple way to mix camera's, JPEG pictures for test cards & audio
- Click External button to export to DATV Express

Express DVB-S Transmitter



- Capture video from VMix or direct from camera or capture card
- Simple to adjust all settings
- Can save settings files for quick changes

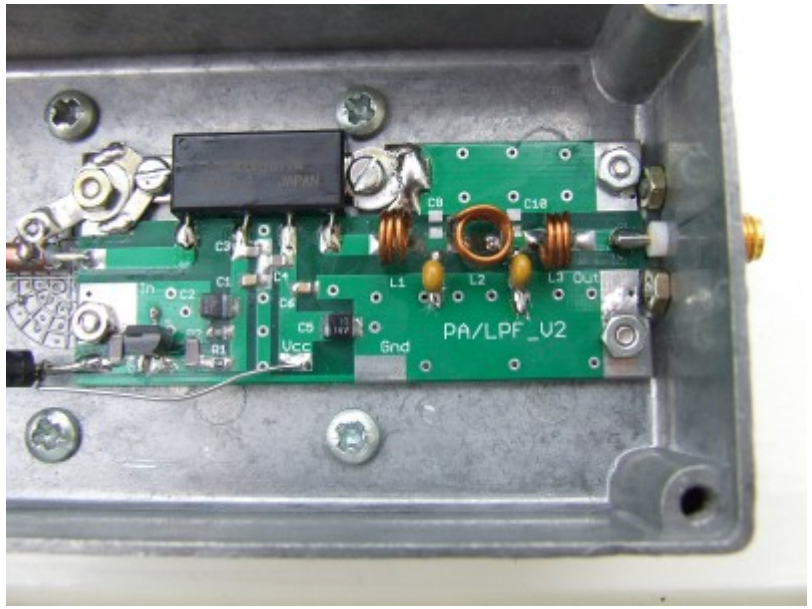
Amplification & Filtering

- All digital transmitters have low level outputs, typically 1-10mW
- Require harmonic filtering
- Require very linear Class A amplification
- Amplifiers must be severely de-rated to maintain linearity

Test Equipment

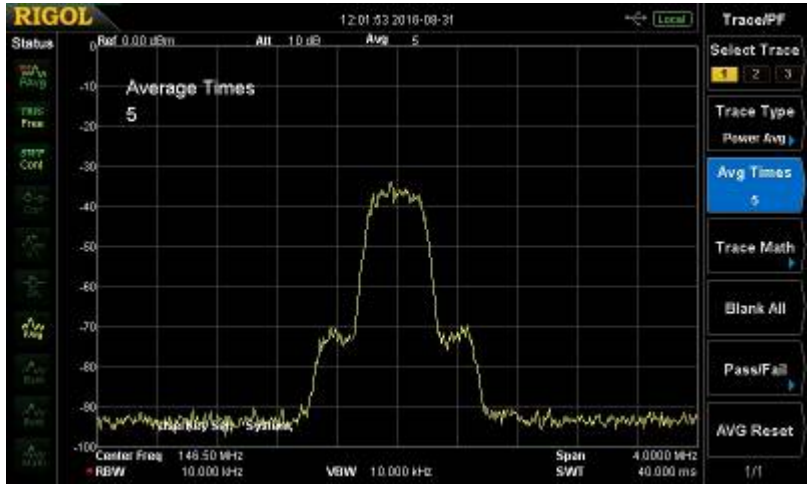
- A Spectrum analyser is essential to check output waveform
- Otherwise follow settings & ratings established by others

Mitsubishi RA08H1317M



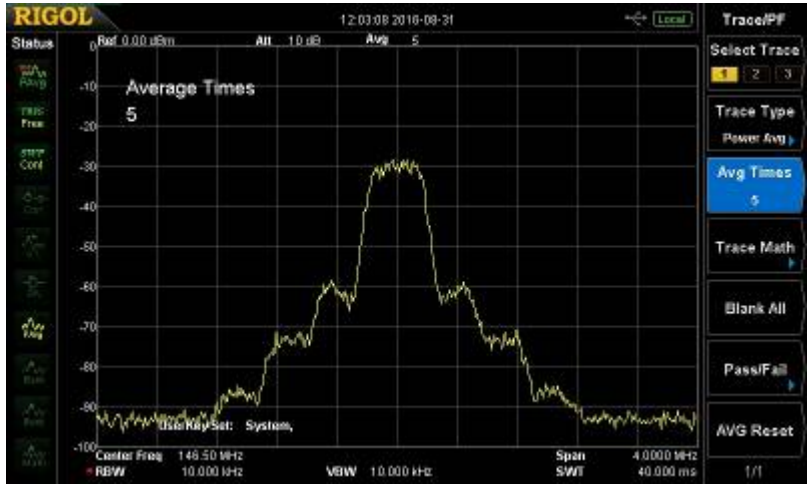
- Module rated at 8W
- PCB & short kit from G4DDK
- Module from Anglia Live
- Low pass filter on output
- Earth links from module fixing bolts to PCB very important

RA08H1317M Low Power



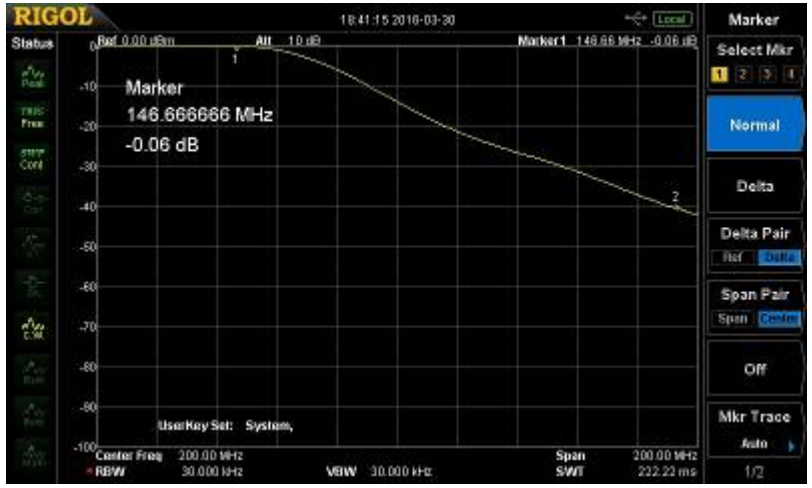
- DATV Express drive level 20
- Output 300mW
- Spectral re-growth “shoulders” 40dB down

RA08H1317M higher power



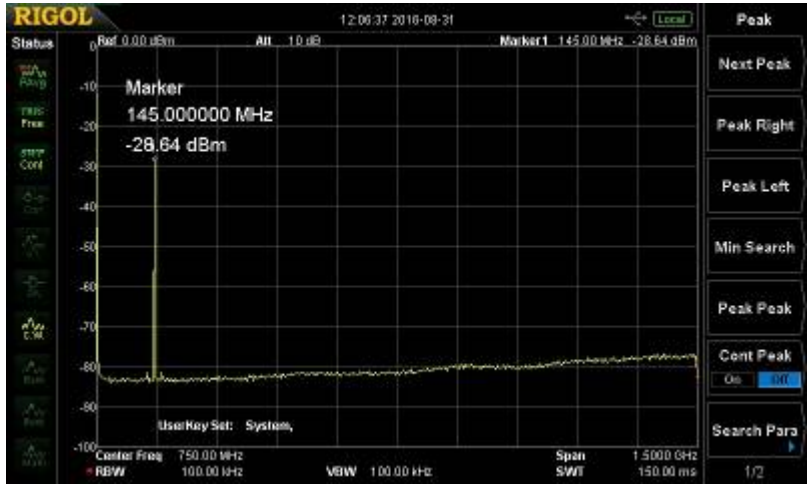
- DATV Express drive level 27
- 1.3W output
- Shoulders 35dB down with secondary ones developing
- Will deliver 2-3W

Low Pass Filter



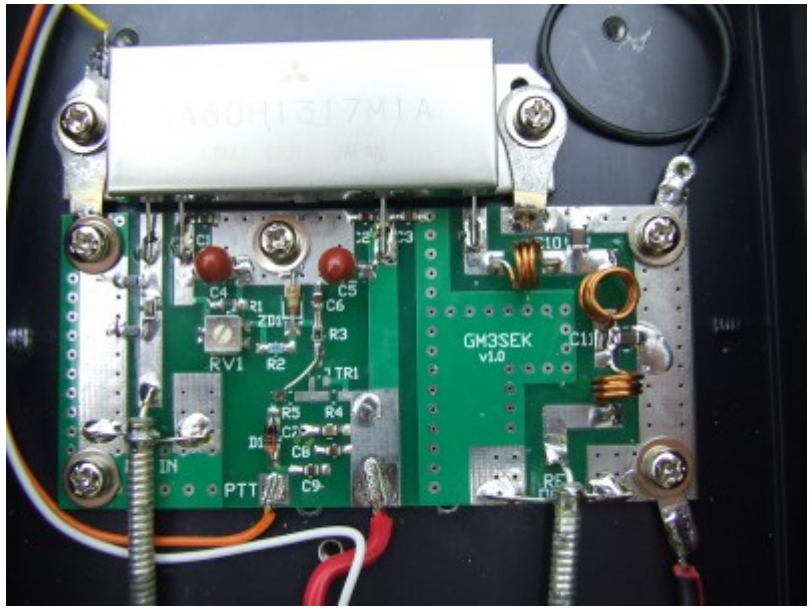
- Low pass filter very effective
- Cut off starts at about 160MHz
- Low through loss

Low Pass Filter



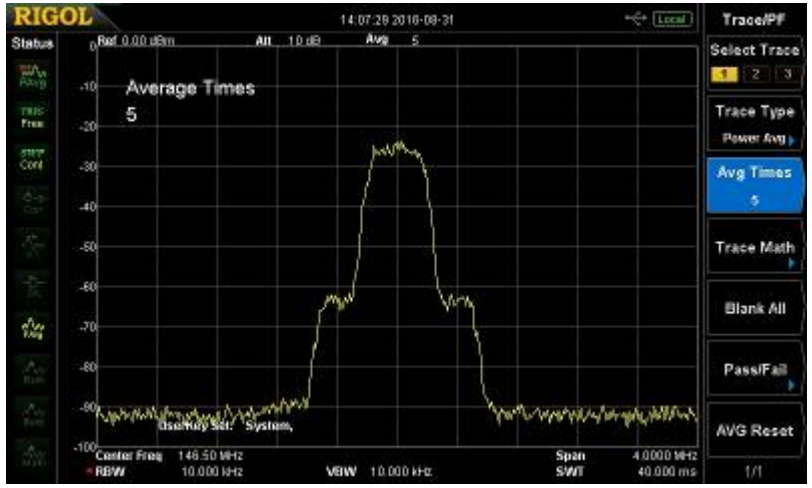
- No harmonics detected to 1.5GHz

Mitsubishi RA60H1317M1



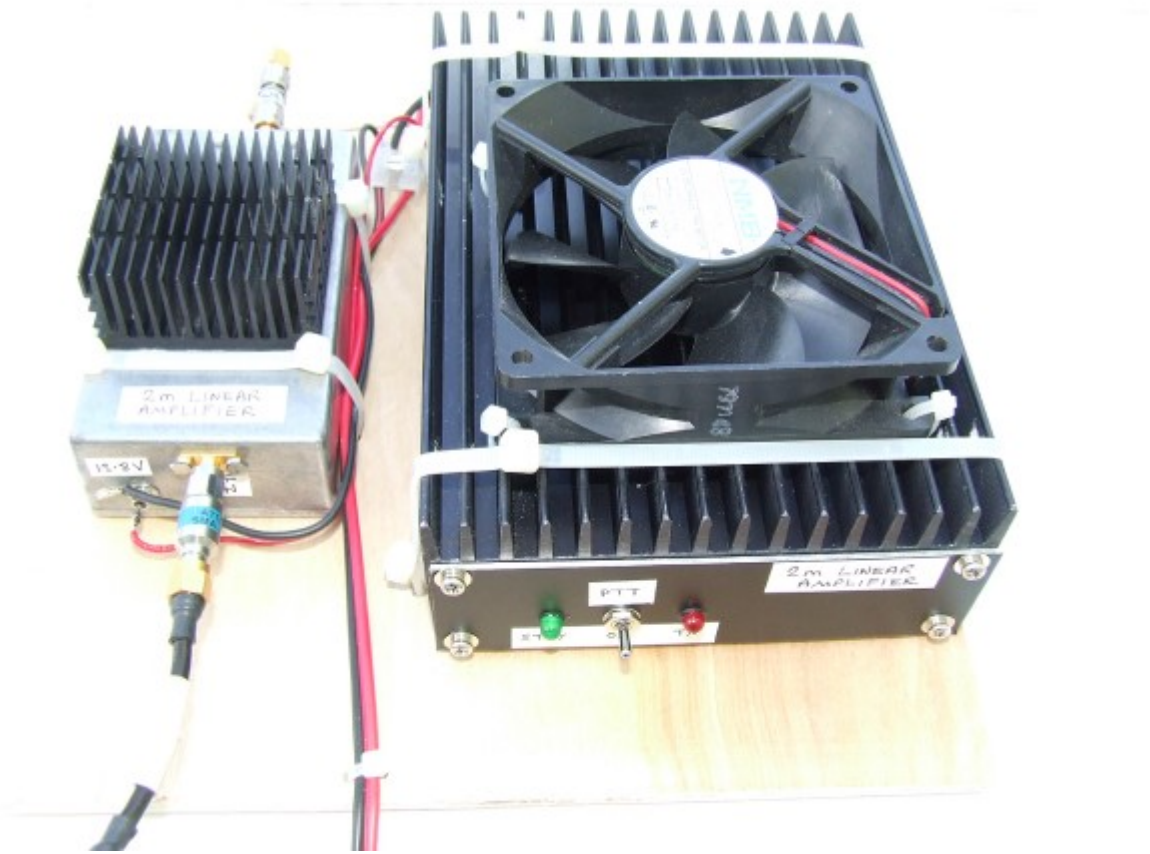
- Module rated at 60W
- GM3SEK PCB available from G4DDK
- Module from Anglia Live
- Ready built version from Roberto DG0VE

Mitsubishi RA60H1317M



- Quiescent current about 4A
- Needs good heatsink & fan!
- Output 8W
- Shoulders 40dB down
- Will go to 15W

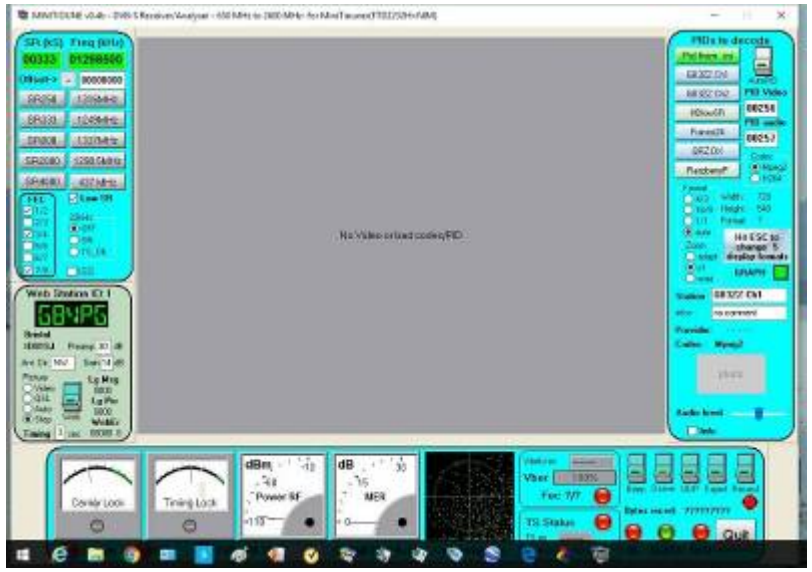
The completed amplifier ...



RB-TV Reception

- Standard satellite receivers are unsuitable for RB-TV reception
- Receive to 2Ms/s, some 1Ms/s at best
- Another idea is needed for RB-TV

Tutioune/Minitioune



- A software based receiver is needed for RB-TV
- Tutioune/Minitioune is used by most ATVers
- Some work starting on RTL Dongles

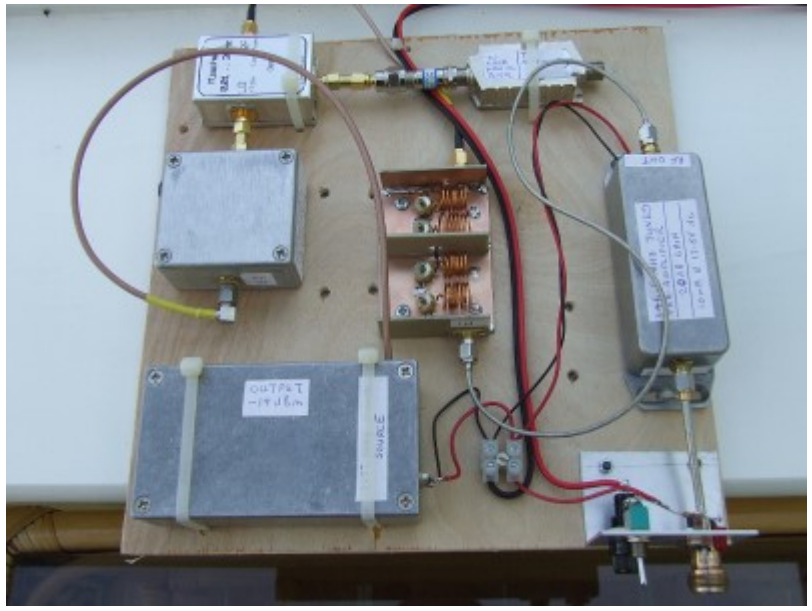
Minitiouner

- Original PCI card satellite tuner obsolete
- Minitiouner provides a USB connected solution
- All symbol rates

BATC Minitiouner

- BATC PCB available
- FTDI USB Module available from BATC
- BATC Sharp tuner module tunes 650-2600MHz
- 1V regulator also available from BATC

146MHz upconverter

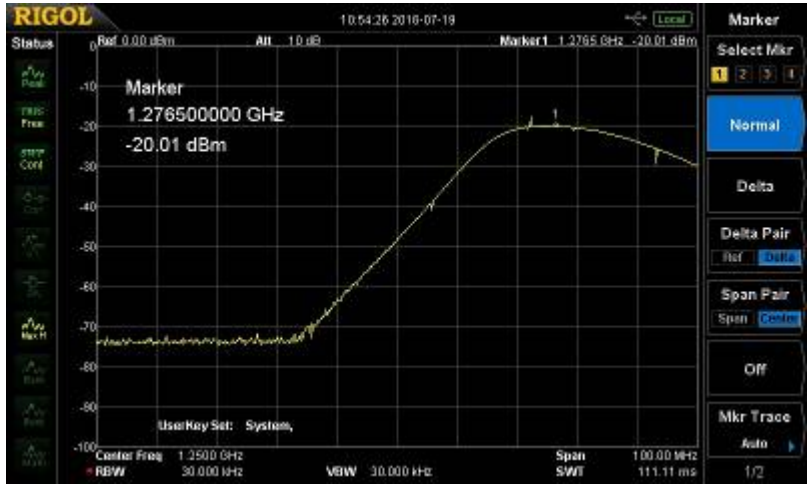


- Need to convert 146MHz up to satellite tuner range
- Homebrew upconverter assembled from various parts
- Commercial items available from DG0VE

Ready made up-converter

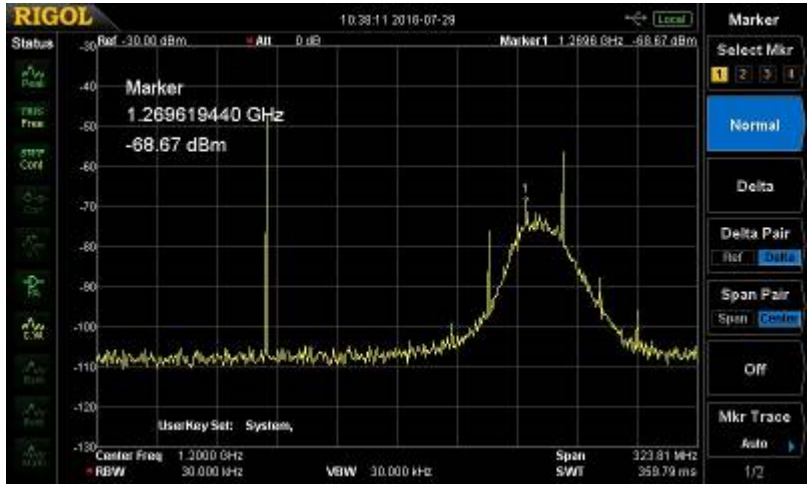
- Available from Roberto DG0VE
- 50dB overall conversion gain
- 0.4dB noise figure
- Choice of four LO frequencies
- Powered up co-ax but watch current!

Choose LO carefully!



- 1100, 1115, 1130 & 1145MHz LO frequencies available
- Only 1130MHz co-incides with bandpass filter peak
- Needs filter re-tuning to use other frequencies

Local Oscillator Spurs



- A second unit for GB3ZZ 146.5MHz input had LO spurs
- One 6.5MHz from output frequency prevented picture lock
- Returned to DG0VE for repair
- Check yours!